CHAPTER 2. ALTERNATIVES, INCLUDING THE PROPOSED ACTION

Introduction

This chapter describes the alternatives considered for the Fish Passage and Aquatic Habitat Restoration at Hemlock Dam. The alternative descriptions refer to structural features that are depicted in Figure 2-1.

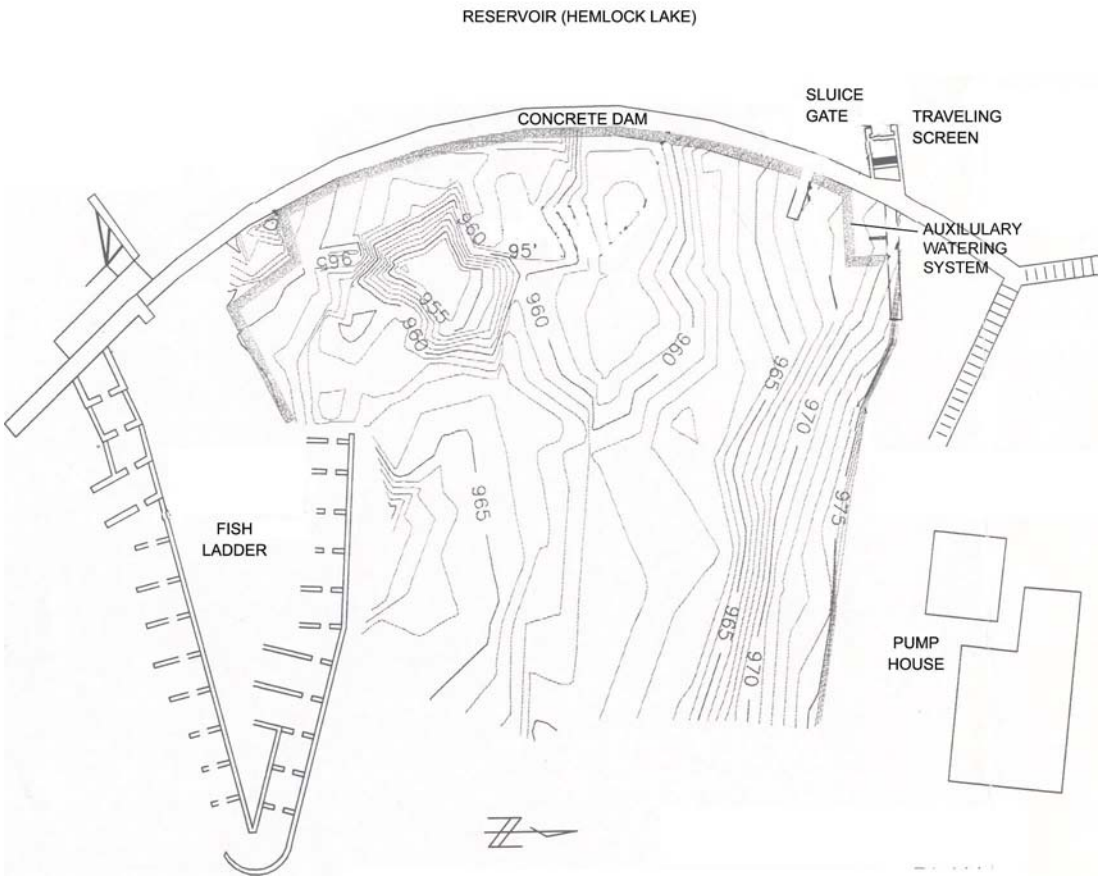

Figure 2-1. Hemlock Dam and structural features.

This section also presents the alternatives in comparative form (Table 2-1), sharply defining the differences between each alternative and providing a clear basis for choice among options by the decision maker and the public.

Alternatives Considered in Detail

The Forest Service developed five alternatives, including the No Action and Proposed Action alternatives, in response to issues raised by the public. Three alternatives to the Proposed Action were designed to address certain key issues, as identified in Chapter 1.

Alternative A

No Action

Under the No Action alternative, the dam and the surrounding area would not be changed from the present condition or management. The dam and fish ladder structures would be maintained to approximately the same levels as at present.

The No Action alternative serves as a baseline for comparison of effects of the action alternatives. Further analysis should confirm that this alternative does not meet the purpose and need for action.

Alternative B

The Proposed Action - Remove the dam and let the river erode sediments in the reservoir

The proposed action would remove Hemlock Dam. Actions associated with the dam removal include:

- Dredge and remove a portion of sediment from the reservoir (estimated 2,500 cubic yards).
- Dispose of the dredged sediments
- Fully remove and dispose of the dam, including abutments
- Shape and stabilize the channel where necessary in the affected reach
- Make necessary alterations at the Hemlock recreational site to accommodate the new stream channel and loss of the reservoir and dam.

The dam would be removed by mechanical means using heavy equipment to incrementally take the dam apart. The fish ladder would remain for historical/interpretive purposes however the recently added attraction chamber would be removed. The pump house located immediately below the dam on the north bank of Trout Creek (refer to Fig. 2-1) would be removed.

Equipment access to dam for removal and disposal would be made available at the pump house site and at points immediately upstream and downstream of the bridge, at both ends of the bridge. The Carson-Guler quarry would be designated the disposal site for concrete dam material, estimated to total approximately 440 cubic yards.

A pilot channel through the reservoir would be excavated to direct the channel incision to the suspected historic channel alignment (Fig. 2-2), while letting the river create its own channel. This action includes removing approximately 2,500 yards of sediment from the suspected historic channel alignment. After constructing the pilot channel, the channel thalweg at the upper end of the reservoir would be redirected toward the southern channel alignment, to ensure that the

headcut occurs along that alignment. Access for equipment for this action would be provided at the existing boat launch site.

The area around the channel would be contoured, making use of channel dredge materials. Excess dredged material would be transported to a nearby disposal site in an unused portion of the former Wind River Nursery.

Over the next one to three years following dam removal, streambanks would be shaped, stabilized, and revegetated, as needed, for approximately 1,300 feet upstream of the dam in the area influenced by the dam. Following stabilization of the channel, trail access would be provided from the recreational site to the channel near the upstream end of the existing reservoir and to the terrace where the pump house now sits. The lower trail would provide opportunities to interpret the historic fish ladder, the pump house location, and the former site of the dam. The trail to the channel near the upstream end of the existing reservoir would leave the recreation area from the area of the boat launch.

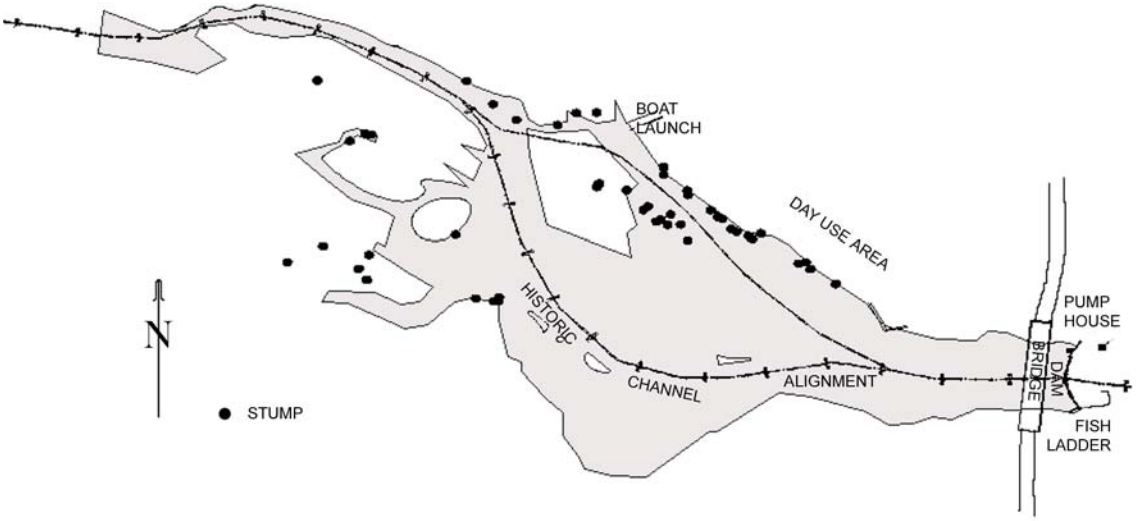

Figure 2-2. Plan view of Hemlock Dam and reservoir.

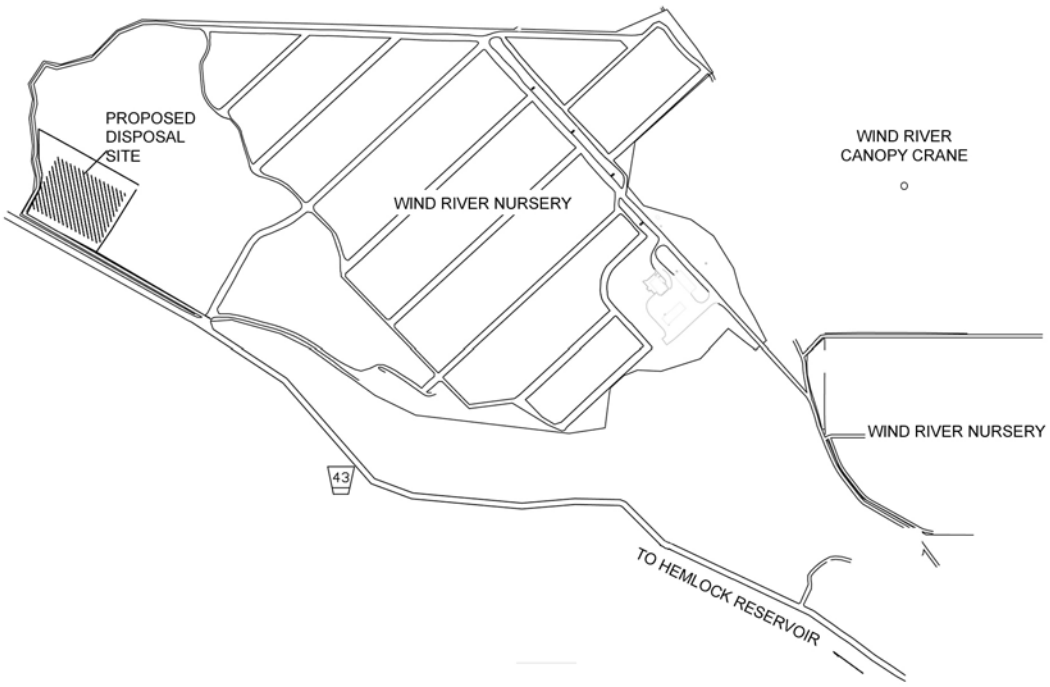

Figure 2-3. Proposed location for sediment disposal.

Alternative C

Remove the dam and dredge all sediments from proposed channel location

Alternative C would remove Hemlock Dam and most of the sediments accumulated in the portion of the channel that passes through the reservoir. This alternative was developed to address the issue of sediment. It was designed to protect fish from impacts of high turbidity associated with leaving sediments in place or from uncontrolled deposition downstream and at the mouth of the Wind River.

Actions associated with the dam removal include:

- Dredge and remove sediments from the reservoir (estimated 20,000 – 35,000 cubic yards).
- Dispose of the dredged sediments
- Fully remove and dispose of the dam, including abutments
- Shape and stabilize the channel where necessary in the affected reach
- Make necessary alterations at the Hemlock recreational site to accommodate the new stream channel and loss of the reservoir and dam.

The principal difference between Alternative 2 and the Proposed Action is the disposition of approximately 20,00 – 35,000 cubic yards of accumulated sediments in the reservoir. These sediments would be dredged from the site designated for channel (Fig. 2-2). The excavated channel would be a restoration of the historical channel, using historic photos, analysis of stumps, and other means of identifying depth to bedrock. The streambanks and disturbed areas would be revegetated.

Equipment access for sediment removal would be at the existing boat launch site. Dredged sediments would be transported to a nearby disposal site in an unused portion of the former Wind River Nursery (Fig. 2-3). This amount of material will cover an area of about 2 acres to an average depth of seven feet. The deposited sediments will be contoured to blend with the surrounding terrain and seeded for erosion control.

Following stabilization of the channel, trail access would be provided from the recreational site to the channel near the upstream end of the existing reservoir, and to the terrace where the pump house now sits. The lower trail would provide opportunities to interpret the historic fish ladder and pump house location, as well as the former site of the dam. The trail to the channel near the upstream end of the existing reservoir would leave the recreation area from the area of the boat launch.

Alternative D

Retain the dam, improve deficiencies, and modify or replace the fish ladder

This alternative was developed in response to the issue of maintaining a recreational opportunity (reservoir) and day-use facility while improving conditions for fish passage and improvement of water quality and sediment routing. Sediment removal would maximize fish habitat and water quality enhancement. Recreational benefits of the dredging are considered secondary.

Specific actions associated with retention of the dam include:

- Retain the dam.
- Replace the fish ladder with a new ladder that meets current State standards.
- Modification to the flashboards to eliminate impingement of fish.
- Install a bypass pipe or chute should that routes fish from the screen face to below the dam.
- Modification of the auxiliary water system (AWS) screen to eliminate impingement of fish and to redirect fish toward the bypass pipe/chute.
- Replace the AWS valve
- Install an AWS energy dissipater.
- Develop a plan in consultation with NOAA Fisheries and Washington Department of Fish and Wildlife (WDFW) for operation of an adult fish trap.
- Dredge a portion of the sediments accumulated in the reservoir.
- Re-establish regular use of the sluice gate.

An operational plan for fish passage would be developed with NOAA Fisheries and implemented. This plan would specify include specific measures to permit safe passage of both adult and juvenile fish, including removal or retrofit of components of the dam that are known or suspected to cause fish mortality.

A set of removable wooden flashboards is presently used to regulate the capacity of the reservoir. To reduce impingement of fish, a thick geotextile fabric would be used to block all cracks in the existing wooden flashboards, or an inflatable flashboard system would be developed.

Fish screens are presently used to prevent juvenile fish from passing into the AWS. The screens would be modified to meet NOAA Fisheries criteria for juvenile fish screening. Options for modification include: re-installing the screen to a 60° or greater slope, installing a bypass pipe or

chute to route fish from the screen to below the dam, replacing the AWS valve to make adjustments of water flow easier, installing AWS energy dissipation (i.e. baffles, diffuser panels, etc) at the diffuser to reduce velocities.

A new fish ladder would replace the existing fish ladder. The location of the ladder to the opposite side of the dam may be recommended to permit a more unobstructed passage from the stream channel to the fish ladder.

In 1992, in cooperation with the WDFW, a fish trap was installed at the top of the dam to evaluate population status and prevent hatchery steelhead from entering the watershed and potentially hybridizing with wild fish. This trap would be reinstalled following replacement of the fish ladder and operated cooperatively with WDFW and according to a plan that would be developed in consultation with WDFW and NOAA Fisheries.

Approximately 20,000 cubic yards of accumulated sediments would be removed by dredging from the reservoir area and transported for disposal to a nearby disposal site in an unused portion of the former Wind River Nursery as described in Alternative C.

Routing of sediments to maintain channel depth and to pass accumulated sediments would occur during annual high stream flows in Trout Creek when turbidities are naturally high. A sluice gate was originally installed in the dam for this purpose. Its use on a regular basis would be resumed.

Alternative E

Retain the dam, improve deficiencies, do not modify or replace the fish ladder

Alternative E was designed to address the issues associated with loss of recreational opportunities and the historic significance of the dam and fish ladder while improving conditions for fish. Improvements to the dam components would be made to reduce fish mortality and sediment removal will be done to maximize fish habitat and water quality enhancement. The magnitude of problem that the fish ladder presents to juvenile fish migration is not well understood. Retained in place, its historic significance is thought to outweigh any uncertain harm that it may pose to juvenile fish.

Specific actions associated with retention of the dam and fish ladder include:

- Retain the dam.
- Modification to the flashboards to eliminate impingement of fish.
- Modification of the auxiliary water system (AWS) screen to eliminate impingement of fish and to redirect fish toward the outlet.
- Develop a plan in consultation with NOAA Fisheries and WDFW for operation of the adult fish trap.
- Dredge a portion of the sediments accumulated in the reservoir.
- Re-establish regular use of the sluice gate.

These actions would be identical to those described for Alternative D with the exception of the actions associated with replacement of the fish ladder.

Mitigation Measures

The Forest Service also developed the following mitigation measures to be used as part of all of the action alternatives.

	Mitgation	Alternative(s)
Hydrology-1	A Washington State Hydraulic Permit will be acquired prior to any work activities within the ordinary high water. Stipulations within the permit including timing of work will be adhered to.	B, C, D, E
Hydrology-2	Trout Creek streamflows will be routed past the work area during all construction activities.	B, C, D, E
Hydrology-3	A coffer dam will be constructed on Trout Creek and at the south embayment of the lake to contain streamflow inputs from Trout Creek and small tribs from the south slopes during construction activities.	B, C, D, E
Hydrology-4	All disturbed areas will be mulched and revegetated using native materials	B, C, D, E
Hydrology-5	Re-introduction of Trout Creek flows to the channel following work activities will be done as much as possible to coincide with early fall freshets.	B, C, D, E
Hydrology-6	Pre- and post-project monitoring will be implemented to establish baseline conditions and monitor effects of the project. Channel cross sections, long profiles, channel substrate, water temperature, turbidity will be monitored at select stations and reaches upstream, in the lake reach, and downstream to the mouth of the Wind River. Monitoring plan will be developed prior project implementation, and data will be collected a minimum of two years prior to implementation, and for five years following the project, dependent on funding. Monitoring plan to be coordinated with other interested agencies.	B, C
Hydrology-7	Monitoring of the immediate effects of the removal will be undertaken and continued through the period of active channel incision and adjustment to assess dynamic changes in the channel within the lake or downstream that could affect fish passage, access, or flow paths, and to identify any unexpected situations that require action.	B
Hydrology-8	The sluice gate will be operated annually during periods of high flow to route sediment and to maintain some depth in the lake for improvement of water temperatures. The gate will be opened when flows exceed 1500-2000 cfs to ensure that sediment releases coincide with periods of adequate stream power to move the sediments. Actual discharge levels will be established after development of a turbidity/discharge rating curve to be done prior to project implementation.	D, E

	Mitgation	Alternative(s)
To minimize introduction of sediment into the stream channel, the following construction phases and methods will be implemented and represent typical actions required for implementation of project activities:		
Fish-1	**Equipment Used** Equipment used for dam removal and pilot channel construction would typically consist of a mix of the following: back hoe, bulldozer, tractor, grader, dump truck, front-end loader, hydraulic excavator, crane, pumps, pneumatic rock drill, explosives, hydraulic hammers, hydroseeding truck, hand shovels, and rakes.	B, C
Fish-2	**In-Water Work Windows** Appropriate State of Washington guidelines for timing of in-water work periods for the relevant ESA-listed fish species will be followed. In-water work typically occurs between July 1 and October 1 of a calendar year, except where the potential for greater damage to water quality and fish habitat exists. Work outside this window shall not occur without specific	B, C, D, E

	justification and measures implemented to protect summer steelhead. Exceptions to this timing of in-water work shall be requested and granted from the Service(s). In addition, project activities will typically cease during wet periods, regardless of typical season, that have the potential to generate and deliver sediment to Trout Creek.	
	Fish Handling and Transfer Protocols	
Fish-3	**Isolate Work Area** - Block nets will be set up at both up and downstream locations and will be left in a secured position to exclude fish from entering the project area. The nets will be secured to the stream channel bed and banks until fish capture and transport activities are complete. If block nets are left in place more than one day, the nets will be monitored on a daily basis to ensure they are secured to the banks and free of organic accumulation.	B, C, D, E
Fish-4	**Fish Capture Alternatives** Fish will be collected by hand or dip nets, as the area is slowly dewatered. Seining - Seines with mesh < 1mm will be used to ensure entrapment of the residing ESA-listed steelhead. Minnow traps - Traps will be left in place overnight and in conjunction with seining. Electrofishing - Prior to dewatering, electrofishing will only be used where other means of fish capture may not be feasible or effective. The protocol for electrofishing includes the following: - If fish are observed spawning during the in-water work period, electrofishing shall not contact spawning adult fish or active redds. - Only Direct Current (DC) or Pulsed Direct Current (PDC) shall be used. - Conductivity <100 will use voltage ranges from 900 to 1100. Voltage ranges from 500 to 800 will be used for conductivity from 100 to 300. For conductivity values greater than 300, voltages of less than 400 will be used. - Electrofishing will begin with the minimum pulse width then gradually increase to the point where fish are immobilized and captured. - Extreme care will be taken to avoid anode contact with fish. Once stunned, fish will be removed from the water immediately. - If burning (dark bands on the fish indicate injury) occurs, voltage will be reduced and longer recovery times will be afforded.	B, C, D, E
Fish-5	**Storage and Release** - ESA-listed steelhead within the project area will be handled with extreme care and kept in water the maximum extent possible during transfer procedures. A healthy environment for the stressed fish shall be provided; large buckets (five-gallon minimum to prevent overcrowding) and minimal handling of fish. Large fish will be placed in buckets separate from smaller prey-sized fish. Water temperature and the well-being of captured fish will be monitored in buckets. After fish have recovered, fish will be released upstream of the isolated reach in a pool or area that provides cover and flow refuge. A report detailing fish numbers encountered and/or relocated by species and life history stage, condition (e.g. apparently uninjured, injured, dead) shall be prepared and provided to NOAA Fisheries within 7 working days after any relocation activity. However any mortalities of summer steelhead shall be reported immediately to NOAA Fisheries.	B, C, D, E
	Pollution and Erosion Control Plan (PECP) and Supporting Measures	
Fish-6	A Pollution and Erosion Control Plan (PECP) will be developed for this project. The PECP will include methods and measures that minimize erosion and sedimentation associated with the project. The PECP elements will be in place prior to and at all times during the appropriate project phases. The following mitigation measures will assist in the creation of a PECP.	B, C, D, E
Fish-7	**Follow State Water Quality Guidelines** - All project actions will follow all provisions of the Clean Water Act and provisions for maintenance of water quality standards as described by Washington Department of	All

	Ecology.	
Fish-8	**Spill Prevention Control and Containment Plan (SPCCP) -** The contractor will be required to have a written SPCCP, which describes measures to prevent or reduce impacts from potential spills (fuel, hydraulic fluid, etc). The SPCCP shall contain a description of the hazardous materials that will be used, including inventory, storage, handling, and monitoring.	B, C, D, E
Fish-9	**Minimize Site Preparation Related Impacts** - Site preparation will be completed in the following manner: - The contractor shall have a written erosion and sedimentation prevention and containment plan for the project and shall have all necessary personnel, supplies and equipment available to ensure that the plan is promptly and effectively implemented. - Flag boundaries of clearing limits associated with site access, staging and stockpile areas to minimize overall disturbance and disturbance to critical vegetation. - Establish staging areas (used for heavy equipment storage, vehicle storage, fueling, servicing, etc) along existing roadways or picnic area beyond the 100-year floodprone area in a location and manner that will preclude erosion into or contamination of the stream or floodplain. - Minimize clearing and grubbing activities, if required for preparation of staging or stockpile areas. Stockpile large wood, trees, riparian vegetation, other vegetation, sand, and topsoil removed for establishment of staging area for site restoration. - Place sediment barriers around disturbed sites where potential erosion may enter the stream directly or through road ditches, which are connected to the stream.	B, C, D, E
Fish-10	**Minimize Heavy Equipment Fuel/Oil leakage** - Methods to minimize fuel/oil leakage from construction equipment into the stream channel and floodplain include the following: **-** The contractor shall have a written spill prevention and containment plan for the project and shall have all necessary personnel, supplies and equipment available to ensure that the plan is promptly and effectively implemented. **-** All equipment used for instream or dam decommissioning work shall be cleaned and leaks repaired prior to arriving at the project. Remove external oil and grease, along with dirt and mud. Inspect all equipment before unloading at site. Thereafter, inspect equipment daily for leaks or accumulations of grease, and fix any identified problems before entering streams or areas that drain directly to streams or wetlands. **-** Equipment used for in-stream or riparian work shall be fueled and serviced in an established staging area (at least 150' away from Trout Creek or other water bodies). When not in use, vehicles will be stored in the staging area. **-** Two oil absorbing floating booms appropriate for the size of the stream shall be available on-site during all phases of construction whenever surface water is present. Place booms in a location that facilitates an immediate response to potential petroleum leakage.	B, C, D, E
Fish-11	**Minimize Sedimentation through Dewatering** - Drawdown and/or refill of the lake for any purpose related to this project shall be done in a manner that avoids sudden changes in lake level or stream flow. The frequency and duration of drawdown/refills shall be held to the absolute minimum necessary to complete the project. The contractor shall prepare a "ramping" schedule that reflects these objectives and this schedule must be approved by NOAA Fisheries before lake level manipulations related to this project occur. To minimize project related sediment introduced into the stream and to help meet state turbidity standards, methods to isolate the in-channel project includes the following: **-** Divert flow with pumps or structures such as cofferdams constructed with non- erosive devices, such as sandbags, bladder bags, or other means that divert water.	B, C, D, E

	- The temporary bypass system may consist of non-erosive techniques, such as a pipe or a plastic-lined channel, both of which must be sized large enough to accommodate the predicted peak flow rate during construction. In cases of channel rerouting, water can be diverted to one side of the existing channel. - Dissipate flow at the outfall of the bypass system to diffuse erosive energy of the flow. Place the outflow in an area that minimizes or prevents damage to riparian vegetation. If the diversion inlet is not screened to allow for downstream passage of fish, place diversion outlet in a location that facilitates safe reentry of fish into the stream channel. - When necessary, pump water from the de-watered work area to a temporary storage and treatment site or into upland areas and filter through vegetation prior to reentering the stream channel. - Any water intake structure (pump) will have a fish screen installed, operated and maintained in accordance to NMFS™ fish screen criteria (NMFS,1995) (http://www.nwr.noaa.gov/1hydrop/hydroweb/ferc.htm)	
Fish-12	**Flow Reintroduction** Slowly re-water the construction site to prevent loss of surface water downstream as the construction site streambed absorbs water and to prevent a sudden increase in stream turbidity. Look downstream during re-watering to prevent stranding of aquatic organisms below the construction site.	B, C, D, E
	Site Restoration	
Fish-13	**A revegetation plan** will be prepared by the Forest Service. All disturbed areas shall be rehabilitated and stabilized by seeding and planting with native vegetation. Revegetation would be monitored and maintained for at least three years to ensure a minimum of 80% survival throughout revegetated areas. If survival falls below 80%, additional revegetation would be planted until the threshold for survival is met. All bank stabilization shall be completed and all construction materials, debris, fills, etc shall be removed before the bypass and or cofferdam(s) are removed. - Upon project completion, remove project related waste. Initiate rehabilitation of all disturbed areas in a manner that results in similar or better than pre-work conditions through spreading of stockpiled materials, seeding, and/or planting with native seed mixes or plants. If native stock is not available, use soil- stabilizing vegetation (seed or plants) that does not lead to propagation of exotic species. - Stream channel cross- section and gradient that reflects more natural conditions found up and downstream will be constructed. Large wood and/or boulders may be placed in the reconstructed stream channel and floodplain. - When necessary, access roads, stream channel within the dewatered work area, staging, and stockpile areas will be de-compacted. - In-stream or floodplain restoration material such as large wood and boulders will mimic as much as possible those found in the project vicinity. Such materials may be salvaged from the project site or hauled in from offsite. - Conifers will not be felled in the riparian areas for restoration purposes. Riparian conifers will only be felled for safety. If necessary for safety, trees will be felled toward the stream and leave in place or place them in the stream channel or floodplain. - Necessary site restoration activities such as mulching will occur within five days of the last construction phase.	B, C, D, E
Fish-14	An **on-site pre-construction conference** shall be held at least 7 working days prior to the start of the project. This meeting shall include at a minimum, the contractor, GPNF, and NOAA Fisheries. The purpose of the conference is to ensure that the contractor fully understands and can comply with the terms and conditions of the NOAA Fisheries Endangered Species Act Section 7 Biological Opinion for this project. Suggestions for minor changes to the terms and conditions may be accommodated as a result of this meeting.	B, C, D, E

	Mitgation	Alternative(s)
Cultural-1	A plan will be developed to provide for historic documentation of the splash dam if it is encountered during channel excavation or incision. The documentation would be completed prior to removal of the splash dam.	B, C
Cultural -2	If archaeological sites are impacted during streambank stabilization activities, additional cultural surveys will be conducted and a report prepared.	B, C, D, E
Cultural -3	Archaeological sites will be avoided both in the vicinity of the equipment access routes and in the sediment disposal site.	C

	Mitgation	Alternative(s)
Wildife-1	**Conservation Measure for Northern Spotted Owl:** Blasting using more than 2 pounds of explosives would be prohibited from March 1 to June 30.	B, C
Wildlife-2	**Deer and Elk:** Seed the dredge spoil pile with palatable forage for elk and deer, and allow ungulate access when forage is established.	B, C, D, E
Wildlife-3	**Goldeneye Duck:** For Alternatives D and E, maintain the lake at a full or near full level from about March 15 to October 31.	D, E

Monitoring

There is an opportunity to develop and implement a channel gradient monitoring plan to identify and evaluate any potential fish passage barriers that are encountered by the incising stream. Monitoring should be done at regular intervals throughout the time that the channel is actively downcutting and/or actively migrating. A monitoring plan will be developed and disclosed in the final statement.

Alternatives Considered but Eliminated from Detailed Study

Federal agencies are required by NEPA to rigorously explore and objectively evaluate all reasonable alternatives and to briefly discuss the reasons for eliminating any alternatives that were not developed in detail (40 CFR 1502.14). Internal scoping or public comments received in response to the Proposed Action provided suggestions for alternative methods for achieving the purpose and need. Some of these alternatives may have been outside the scope of improving fish passage and aquatic habitat at Hemlock Dam, duplicative of the alternatives considered in detail, or determined to be infeasible or include components that would cause unnecessary environmental harm. Therefore, a number of alternatives were considered, but dismissed from detailed consideration for reasons summarized below.

Notch the dam, construct a new fish ladder, and create an "off-channel" pond for recreation opportunities.

The original Notice of Intent, published in the *Federal Register* on August 16, 2001 identified an alternative that would remove only a portion of the dam to create a "notch." The main channel

would be routed through the notch to a newly designed fish ladder. This would satisfy the dual needs for this action of improving both fish passage and aquatic habitat and directly address the issue of loss of recreational opportunity with full removal of the dam. The portion of the dam that would be retained would impound water seasonally to create a "pond" for recreational opportunities. The pond would be flooded during peak flows to capacity and then cut-off from the main channel to permit unimpeded stream flows through the channel during periods of low-flow and to create a summer, warm-water recreational pond close to the existing day-use area.

This alternative was eventually considered to be infeasible principally because the effect to the structural integrity of the dam from notching could not be determined and the water quality or quantity of the pond might not be sustainable. As it presently exists, safety analysis of the dam indicates that it is structurally sound. However the structural effects could not predicted following removal of a portion of the dam to a level that would permit natural channel development and optimum flows through a fish ladder. The seasonal pond would also be subject to gradual heating and contamination through the summer. There was no provision for regular introduction of fresh water during low flow periods in the design of the pond. In addition, the integrity of the pond might not be sustainable if the dikes that separated it from the main channel were breeched during peak flow events. This alternative was therefore dropped from further analysis in favor of an alternative that would more directly address the fish passage and water quality deficiencies created by the existing dam while retaining the recreational opportunities associated with the existing reservoir (Alternative E).

Comparison of Alternatives

This section provides a summary of the effects of implementing each alternative. Information in the table is focused on activities and effects where different levels of effects or outputs can be distinguished quantitatively or qualitatively among alternatives.

Table 2-1. Summary of Alternatives.

Feature	Alt A No Action	Alt B Remove Dam (Proposed Action)	Alt C Remove Dam w/ Sediment Dredging	Alt D Retain Dam, Replace Ladder	Alt E Reatain Dam, Retain Ladder
Dam	Retain	Remove and dispose of in Carson Guler Quarry	Remove and dispose of in Carson Guler Quarry	Retain	Retain
Sediment	Retain	Leave (Dredge minor amts)	Dredge and haul to PC Nursery Fields	Dredge and haul to PC Nursery Fields	Dredge and haul to PC Nursery Fields
Flashboards	Retain	Remove	Remove	Repair with geotextile	Repair with geotextile
Ladder	Retain	Retain for historic significance and interpretation	Retain for historic significance and interpretation	Replace ladder	Leave and patch concrete cracks
AWS	Retain	Remove	Remove	Upgrade per NOAA	Upgrade per NOAA
Recreation	Retain	Retain picnic area and river access	Retain picnic area and river access	Retain current recreation site as is	Retain current recreation site as is
Cultural	No change	Retain ladder and abutments	Retain ladder and abutments		